

Date: Tuesday, 5/23/2006 8:19:08 AM  
User: Kim Johnston

## Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: HIGH AFT X-TUBE 412
Job Number	: 27177		
Estimate Number	: 10559		
P.O. Number	: N/A	Part Number	: D412664203
This Issue	: 5/23/2006	S.O. No.	: N/A
Prsht Rev.	: NC	Drawing Number	: D412-664-243 REV B
First Issue	: N/A	Project Number	: N/A
Previous Run	: 27085	Drawing Revision	: B
Written By	: <i>[Signature]</i>	Material	: N/A
Checked & Approved By	: <i>[Signature]</i> 06.05.23	Due Date	: 6/15/2006
Comment	: Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Comments on Pick List JLM	Qty:	1
Um:		Each	

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :	
1.0	DC	DOCUMENT CONTROL	
		Comment: DOCUMENT CONTROL Photocopy bluefile and create labels as per PPP D412-664-203 CHG 003	<i>KJ 06.06.05</i>
2.0	D6009129	Crosstube Material	
		Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) Pick: Qty Part number Description Batch 1 D6009-129 Crosstube <i>B2594Z</i> Check OD = 3.500"; ID = 2.250"	<i>BC 06.05.30</i>
3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE	
		Comment: MORI SEIKI CNC LATHE LARGE  1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166  2-Turn first side as per Folio FA166  3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243.	<i>BC 06.05.30</i>
4.0	QC1	INSPECT ALL DIM TO DIM SHEET	
		Comment: INSPECT ALL DIM TO DIM SHEET	<i>BC 06.05.30</i>

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: \_\_\_\_\_

PAR #: \_\_\_\_\_

Fault Category: \_\_\_\_\_

NCR: Yes No DQA: \_\_\_\_\_

Date: \_\_\_\_\_

NOTE: Date &amp; initial all entries

QA: N/C Closed: \_\_\_\_\_

Date: \_\_\_\_\_

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 27177

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

5.0 MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA166

2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243.

3-Polish entire outside surface of crosstube

4- Remove sand and plugs

5-Scribe part # and batch # using vibrating stylus as per Dwg D412-664-243

BL 06-05-30

1

6.0 QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

BL 06-05-30

1

7.0 QC8

SECOND CHECK



Comment: SECOND CHECK

ER 06/06/02 ✓1

8.0 HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

BL 06-06-08

9.0 QC3/5

INSPECT WORK/WING WALK



Comment: Inspect work & Chemical conversion Coat

DP 6-6-9

10.0 BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

DOG-6-13

11.0 QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

J 06-06-29 0

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: \_\_\_\_\_

PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

H:forms

Date &amp; initial all entries

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Date: Tuesday, 5/23/2006 8:19:08 AM  
User: Kim Johnston

## Process Sheet

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 27177

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

12.0 LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551

PM '06-09-60

2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

PM '06-09-60

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243

PM '06-09-70

13.0 HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

AM

06-09-11

①

PTO

14.0 OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 1998 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

CLO610911 ①

15.0 PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

Lu 9/14 ⑥

16.0 QC6

DIMENSIONAL CHECK



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

Jas-09-15①

17.0 SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

FC 06 09 25 ①

2-Paint outside crosstube with White Imron as per QSI 005 4.2

M 06 09 25 ①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector
06-09-11	13.1	Add QCS form. Change <i>J</i>				<i>J</i> <i>RD</i> <i>QCS</i> <i>J</i>	<i>J</i> 06-09-11
		QCS Inspect work	<i>J</i>	06-09-11	(1)		

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

NOTE: Date & initial all entries QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Date: Tuesday, 5/23/2006 8:19:09 AM  
User: Kim Johnston

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 27177

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

18.0

QC14

Inspect Spray Paint



*J06-09-26*



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

19.0

D2856600

Abrasion Strip



Comment: Qty.: 1.7640 f(s)/Unit Total : 1.7640 f(s)

Pick:

Qty Part number Description Batch  
2 D2856-600(Cut to 10.090") Abrasion Strip B24328 RT 06-09-27

20.0

D2856600

Abrasion Strip



Comment: Qty.: 1.0080 f(s)/Unit Total : 1.0080 f(s)

Pick:

Qty Part number Description Batch  
1 D2856-600(Cut to 10.870") Abrasion Strip B24328 RT 06-09-27

21.0

D28961

Support



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch  
1 D2896-1 Support 26683 RT 06-09-27

22.0

D31891

Chafing Shield



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch  
2 D3189-1 Chafing Shield B27190 RT 06-09-27

23.0

MS2192028

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Pick:

Qty Part number Description Batch  
4 MS21920-28 Clamp M101684 RT 06-09-27

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

NOTE: Date & initial all entries

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Date: Tuesday, 5/23/2006 8:19:09 AM  
User: Kim Johnston

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 27177

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

24.0 MS2192030 clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch  
2 MS21920-30 Clamp M101568

25 06-09-27

25.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

Assemble as per Dwg D412-664-203

25 06-09-28

26.0 QC5 INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DJ 6-9-28

27.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

28.0 AN640A Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

✓ Batch: M101124

29.0 AN641A Bolt



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Bolt

✓ Batch: M101418

30.0 AN960JD616 Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

✓ Batch: M101697

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
			Initial Design Mgr	Action Description Design Mgr	Sign & Date			

Part No: \_\_\_\_\_

PAR #: \_\_\_\_\_

Fault Category: \_\_\_\_\_

NCR: Yes

(No)

DQA: Date:  10/03

NOTE: Date &amp; initial all entries

QA: N/C Closed: \_\_\_\_\_

Date: \_\_\_\_\_

Date: Tuesday, 5/23/2006 8:19:09 AM  
User: Kim Johnston

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 27177

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
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31.0	MS21042L6	Nut
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Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

✓ Nut

Batch: M100151 ✓

11/9/2006 ①

32.0	QC4	INSPECT 100% KITS FOR COMPLETENESS
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11/9/2006 ①

Comment: INSPECT 100% KITS FOR COMPLETENESS

33.0	PACKAGING 1	PACKAGING RESOURCE #1
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Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-203

Location: \_\_\_\_\_

PPP Rev: 1

11/9/2006 ①

34.0	DC	DOCUMENT CONTROL
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11/9/2006 ①

Comment: DOCUMENT CONTROL

Inspection Level 21

Job Completion



11/9/2006 ①

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE		By	Date	Qty	Approval Mfg / Design Mgr	Approval QC Inspector

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Design Mgr	Approval QC Inspector
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

NOTE: Date & initial all entries QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

DART AEROSPACE LTD	Work Order:	27177
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: B		Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST

First Article     Prototype

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000	2.687	✓		
	2.748	+0.005/-0.000	2.753	—		
	2.884	+0.005/-0.000	2.887	—		
	3.019	+0.005/-0.000	3.023	—		
	3.163	+0.005/-0.000	3.166	—		
	3.308	+0.005/-0.000	3.310	—		
	3.429	+0.005/-0.000	3.432	—		
	2.990	+0.005/-0.000	2.993	—		
	2.618	+0.005/-0.000	2.622	—		
			—			
	0.200	+/-0.010	.200	—		
	R0.063	+/-0.010	.063	—		
	R0.500	+/-0.010	.500	—		
	4.971	+/-0.001	4.971	—		
			—			
			—			
SIDE B	2.684	+0.005/-0.000	2.688	—		
	2.748	+0.005/-0.000	2.752	—		
	2.884	+0.005/-0.000	2.887	—		
	3.019	+0.005/-0.000	3.021	—		
	3.163	+0.005/-0.000	3.165	—		
	3.308	+0.005/-0.000	3.310	✓		
	3.429	+0.005/-0.000	3.432	—		
	2.990	+0.005/-0.000	2.992	—		
	2.618	+0.005/-0.000	2.621	✓		
			—			
	0.200	+/-0.010	.200	—		
	R0.063	+/-0.010	.063	—		
	R0.500	+/-0.010	.500	—		
	4.971	+/-0.001	4.971	—		
	124.09	+/-0.020	124.09	—		

Measured by:	BS	Audited by:	EP	Prototype Approval:	N/A
Date:	06.05.30	Date:	06/06/02	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	JL



DESIGN PH	DRAWN BY PH	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <del>✓</del>	APPROVED <del>✓</del>	DRAWING NO. D412-664-243	REV. B SHEET 1 OF 3
DATE 05.02.04	TITLE CROSSTUBE ASSEMBLY (412 HI AFT)		SCALE NTS
A	01.10.17	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	

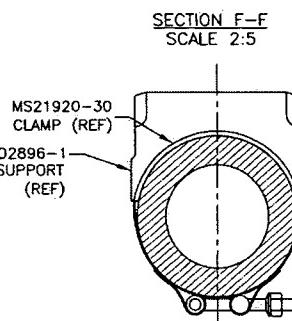
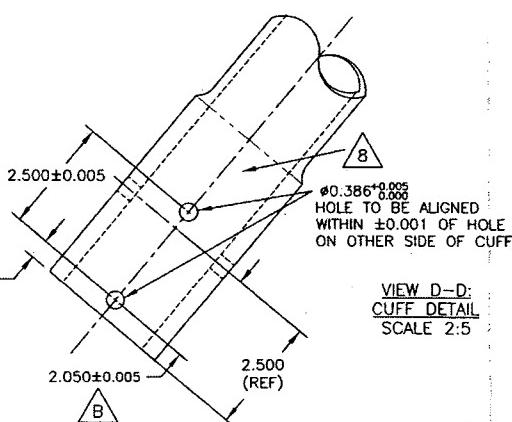
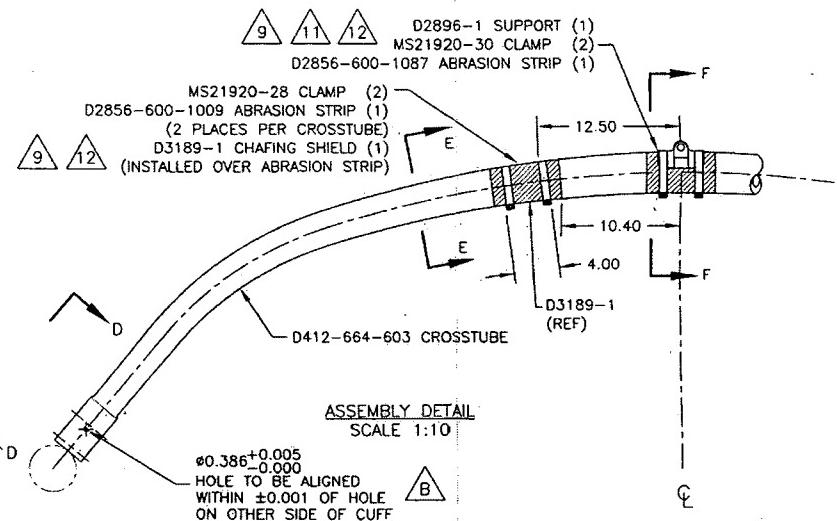
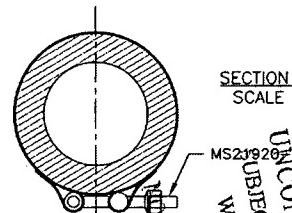
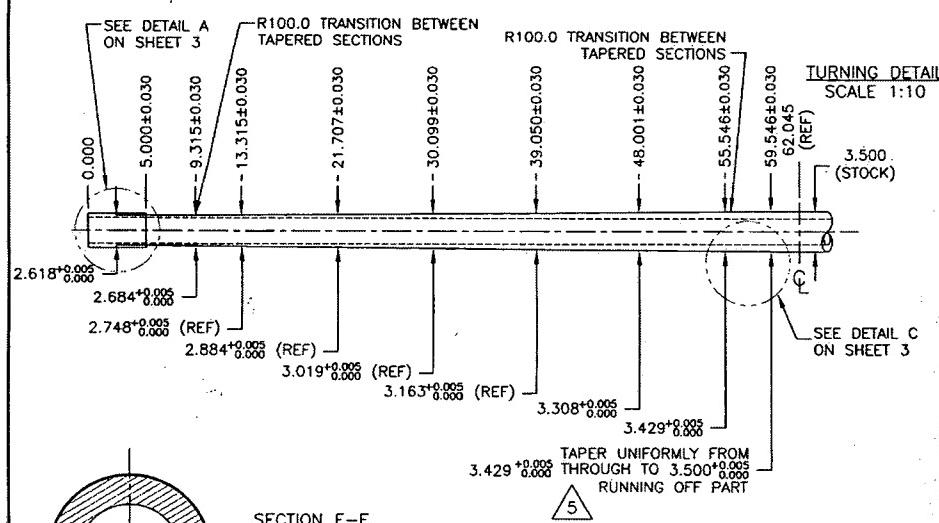
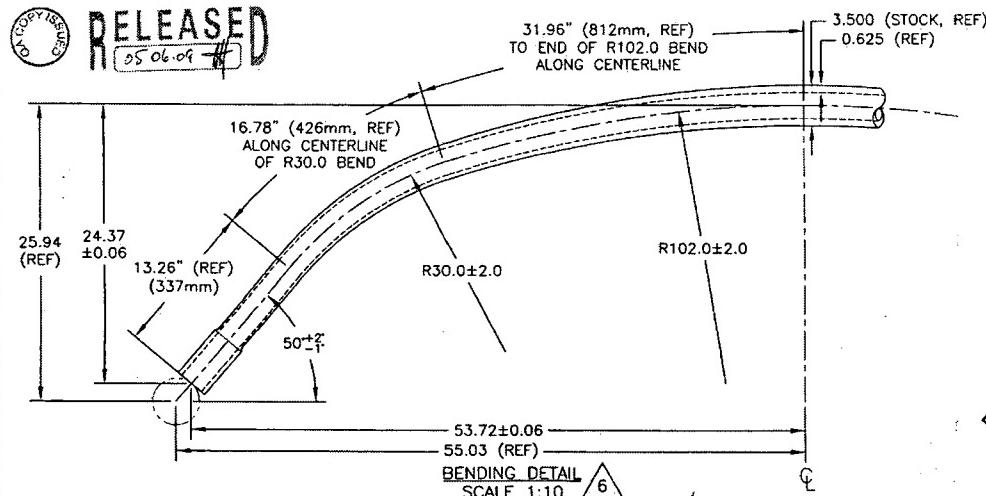
**RELEASED**  
05.06.09 ~~PH~~

Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
1	D2856-600-1087	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP
2	D3189-1	CHAFING SHIELD

#### GENERAL NOTES:

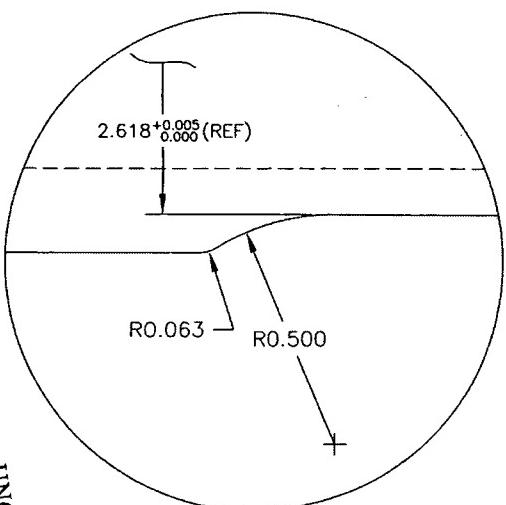
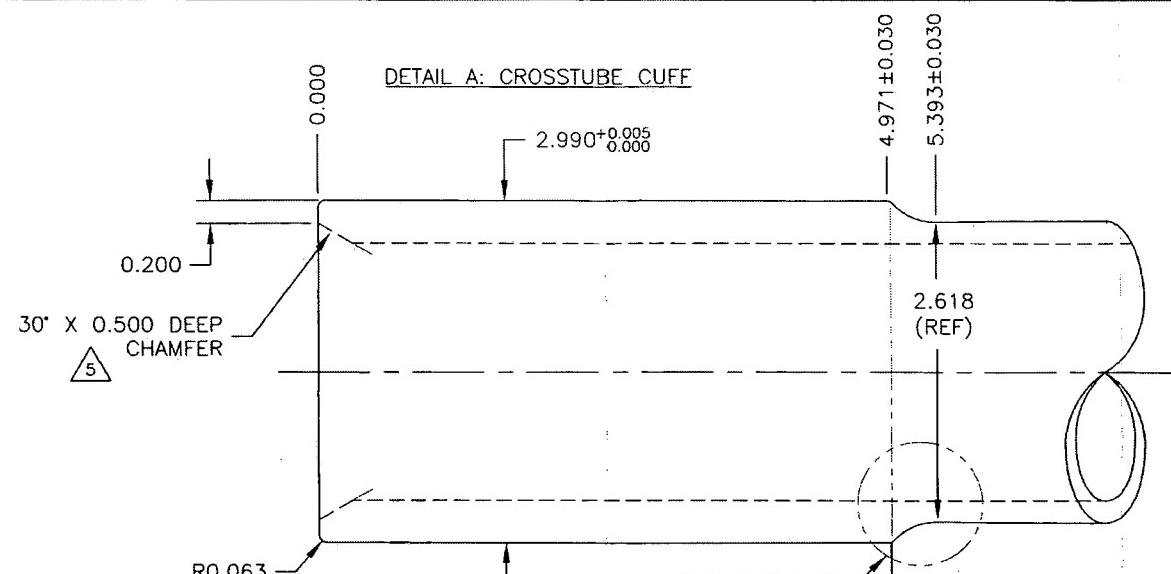
- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH =  $124.09 \pm 0.020$
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 AND D2856-600-1087 ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D2896-1 SUPPORT, PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS COPY SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) IT IS OPTIONAL TO SEAL EDGES OF SUPPORTS USING SIKAFLEX-241/291 SEALANT.
- 12) TORQUE CLAMPS 80 TO 100 IN-LB.

RELEASED  
05/06/09

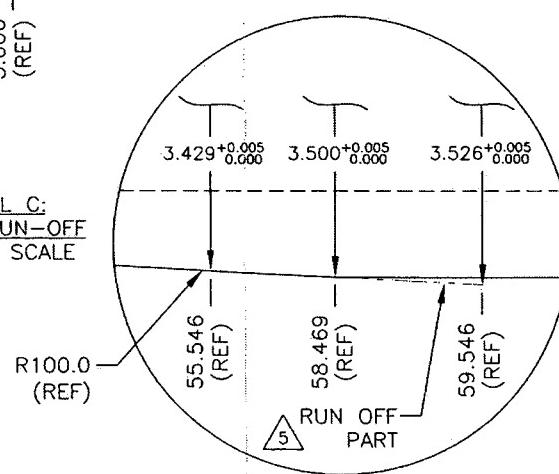


DESIGN	DRAWN BY	DART	DART AEROSPACE LTD. MANNESBURG, ONTARIO, CANADA
PH	PH		REV. B
CHECKED	APPROVED		DRAWING NO. D412-664-243
DATE	05.02.04		TITLE CROSSTUBE ASSEMBLY (412 HI AFT) 1:10

RELEASED  
05.06.09

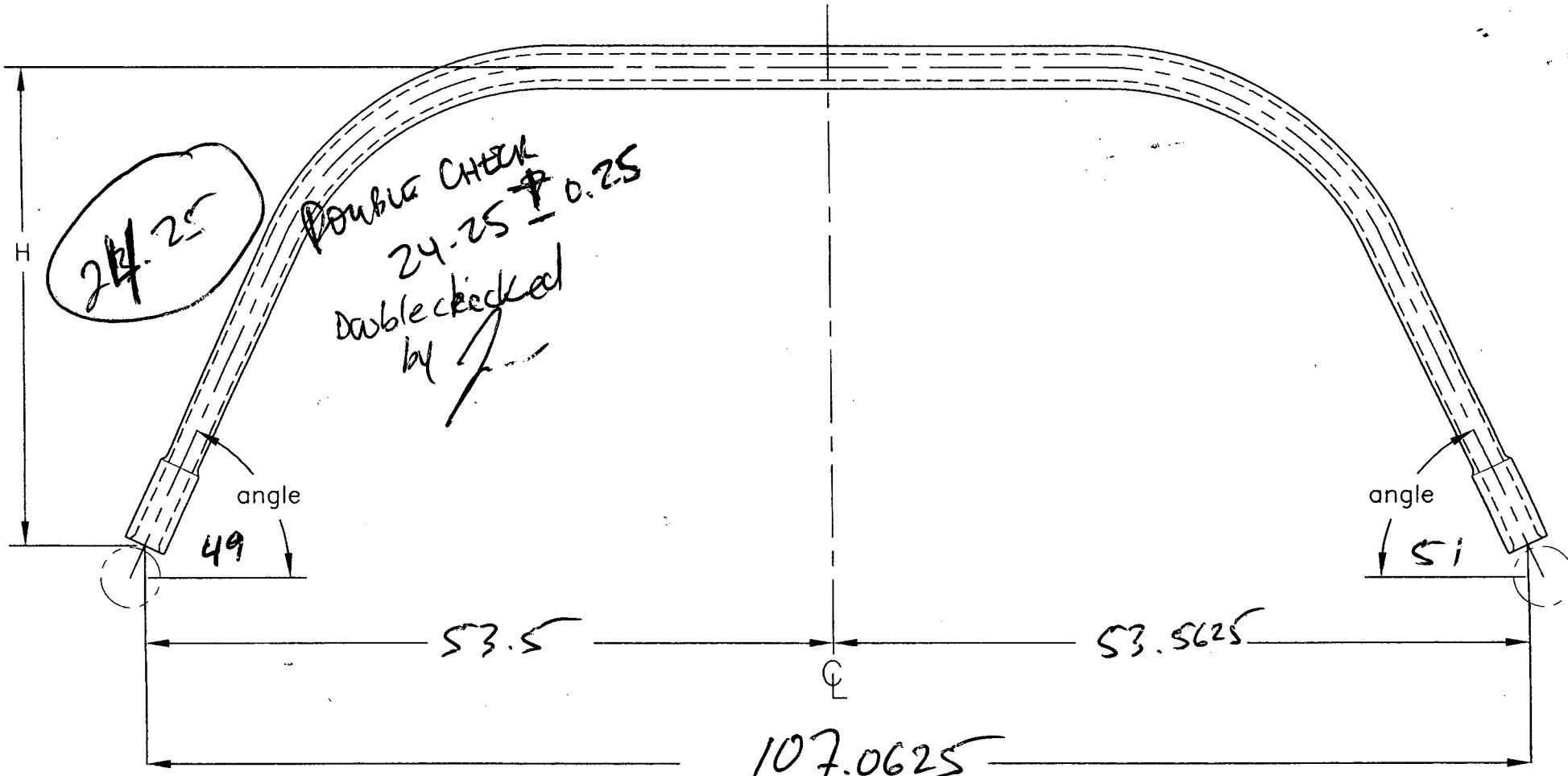


DETAIL C:  
TAPER RUN-OFF  
NOT TO SCALE



DESIGN	DRAWN BY	DART	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
PH	PH		
CHECKED	APPROVED	DRAWING NO.	REV. B
		D412-664-243	SHEET 3 OF 3
DATE		TITLE	SCALE
05.02.04		CROSSTUBE ASSEMBLY (412 HI AFT)	1:1

NO. 2715  
UNCONTROLLED SUBJECT TO AMENDMENT  
WORK ORDER WITHOUT NOTICE  
ENGINEERING COPY  
RETURN TO  
SHOP COPY



DATE: 06.06.29

DESCRIPTION: 412-664-203

BATCH NO: 27177

DRAWING: 412-664-243 R:6.

$H: 24.37 \} \pm .06$

$1/2$  SPAN: 53.72  $\} \pm .06$

TOTAL SPAN: 107.44

ANGLE:  $50^{\circ} \pm 2$

ACCEPTABLE  
DEVIATION

~~#~~ 06.06.29

06.06.29



**HeathAir**  
INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3  
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 34841

A.M.O. Number: 46/90

## NON-DESTRUCTIVE TESTING REPORT

### AIRCRAFT / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

### INSPECTION REQUIREMENTS

Carry out FPI of (5) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty (2) P/N D206-667-203 Cross tubes S/N's B28058 and B28374.  
Qty (3) P/N D412-664-203 Cross tubes S/N's B27181, B27263 and B27177

RADIOGRAPHY

ULTRASONIC

PENETRANT

MAGNETIC PARTICLE

EDDY CURRENT

### INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on (5) Cross Tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)  
Ardrox 970P25E Batch #04B503.

(5) cross tubes inspected. (5) PASSED inspection / (0) FAILED inspection.

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH  
THE APPLICABLE STANDARDS OF AIRWORTHINESS

INSPECTED BY:

DATE September 13, 2006

INSPECTION  
STAMP(S)

Dart Aerospace  
CUSTOMER:

### CUSTOMER INFORMATION

P.O. NUMBER

1998

Linda

CONTACT NAME:

ADDRESS:

LABOUR

F. 613-632-1053

\$

MATERIALS

②

GST

TRAVEL EXPENSES

②

PST

HOTEL EXPENSES

②

INVOICE NO.

TOTAL \$